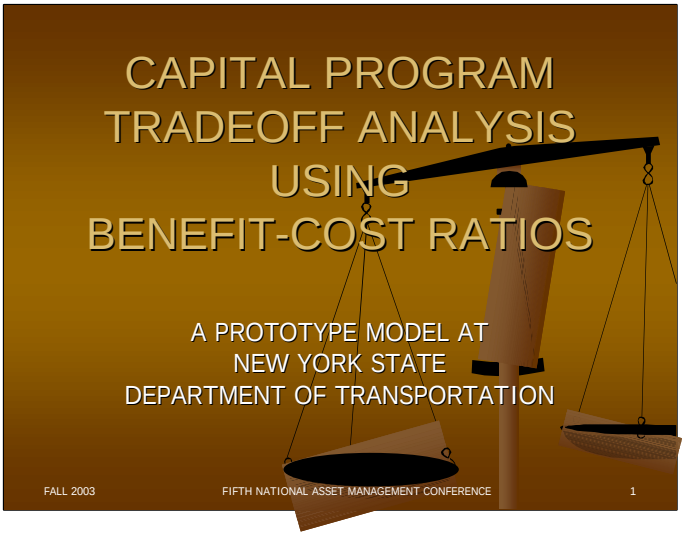


MODERATOR INTRODUCTION:
(PLEASE DO NOT USE ALL OF THE DETAIL PROVIDED)

Our next speaker is Lou Adams from the New York State Department of Transportation.

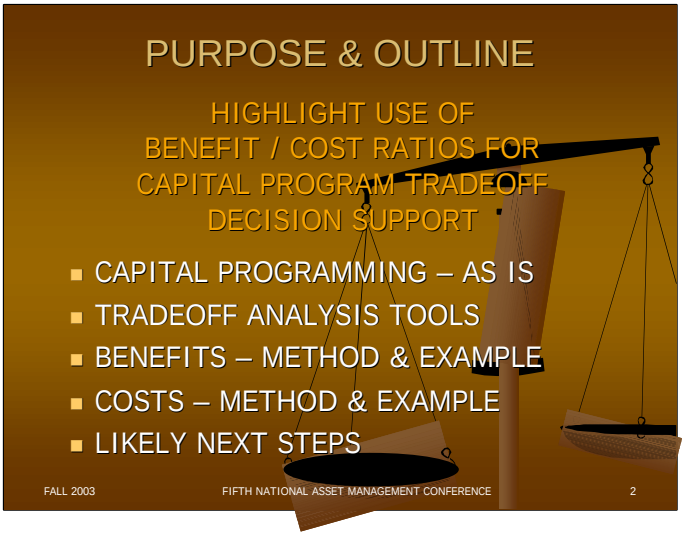
Lou will explain a tradeoff model that uses benefit - cost ratios to evaluate alternatives as a part of the capital program development process.

Lou is presently serving as “Technical Manager” of the “Modeling and Forecasting Team” within the “Planning and Strategy Group”.

He also serves as webmaster for the AASHTO Transportation Asset Management Today site, which is growing quickly, and had almost 5,000 visitor sessions in July 2003.

(He is experienced in: engineering management, economic analysis, evaluation of capital project alternatives, pavement management, technical communications, travel demand forecasting, traffic control devices, large traffic control systems, computer program functional specification, and acceptance of computer software and documentation.)

(Lou’s earned a bachelor’s degree in Civil Engineering from Rensselaer Polytechnic Institute. His master’s level course work was completed at Northwestern University.)



The purpose of this presentation is to highlight use of benefit / cost ratios to inform tradeoff decisions that are a part of capital program development and management.

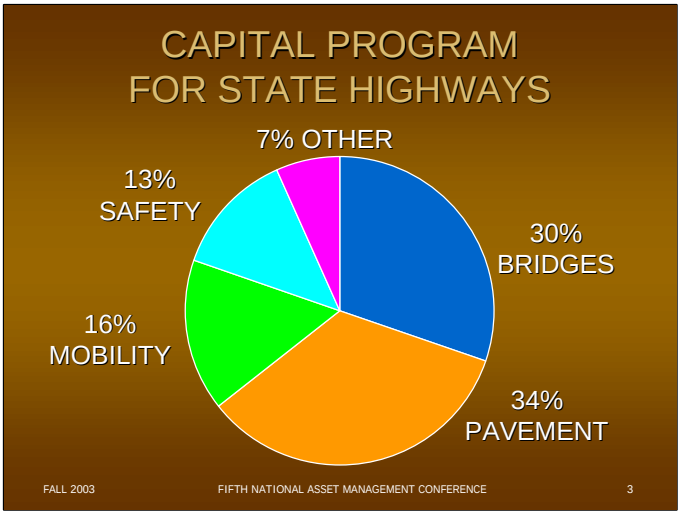
Sections within the presentation are:

the current programming process,

economic evaluation tools applicable to tradeoff analysis,

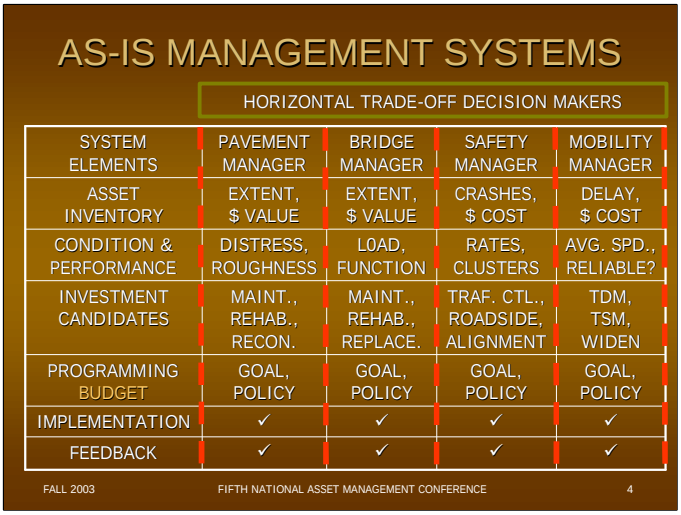
explanations by method and example of a benefit / cost tradeoff model, and

likely next steps.



New York's 1.3 billion dollar per year capital program for state highways is currently managed using four goal areas: bridges, pavement, mobility, and safety. Each regional office programs the dollar amount they are allocated by the main office. The statewide investment percentages for each goal result from decentralized programming decisions made by the regional offices, and subsequently approved by the main office. The program update process occurs biennially.

(Implementation of asset management principles will assure that program balance among the goal areas and investment strategies within each goal area maximize the long-term net benefits at minimum life cycle cost.)

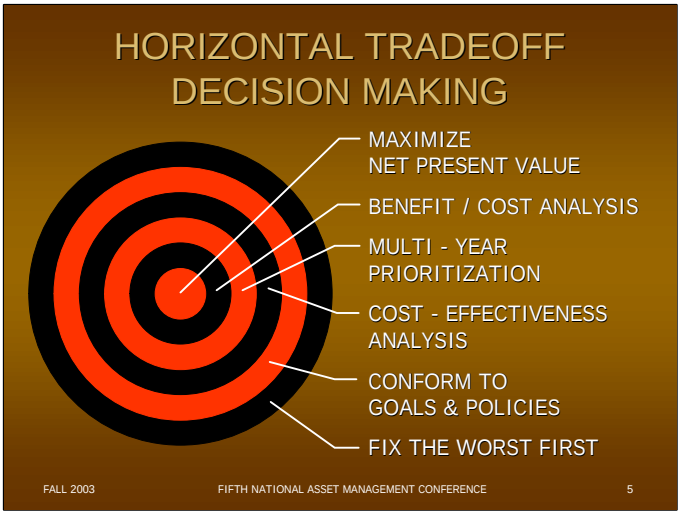


Currently, New York State DOT, along with most transportation agencies, is managing individual assets vertically, in what Easterners call “stovepipes” and what Mid-westerners call “silos”. Fire walls, shown as vertical red dashed lines, isolate each goal area from comprehensive horizontal decision making across all goal areas. The overall budget constraint drives the process.

All of the elements of transportation asset management, shown in the left-most column, are present for each goal area. However, the information available from each vertical process is not useful to the managers who make horizontal trade-off decisions among the goal areas. One principal shortcoming is lack of a common measure of performance that can be applied to all investment candidates.

(In New York, 60 decision-makers and managers lead the capital programming process, each on a part-time and infrequent basis. The persuasiveness of each goal manager in each regional office and at the main office affects the outcome. So do the limited prior experiences of the regional and main office executives who make the horizontal tradeoff decisions.)

(In summary, to date, the capital programming process has not evaluated all tradeoffs to assure that the overall program of projects results in the most benefit to the customer.)



Department staff have developed an operational prototype of an economic evaluation tradeoff model. It provides systematic, consistent and standardized decision-support information for the horizontal or cross-cutting aspect of capital program development. A benefit-cost ratio is calculated for each investment candidate, that is subject to many simplifying assumptions and limitations.

The target diagram shows “maximize net present value” as the bulls-eye that economists recommend using to evaluate economic efficiency over the long-term. This method becomes intractable at the statewide capital programming level due to the great number of alternative scopes and schedules for competing investment candidates.

Farthest from the bulls-eye is an inefficient decision rule that defers infrastructure preservation, incurs accelerated deterioration, and requires premature reconstruction or replacement of assets.

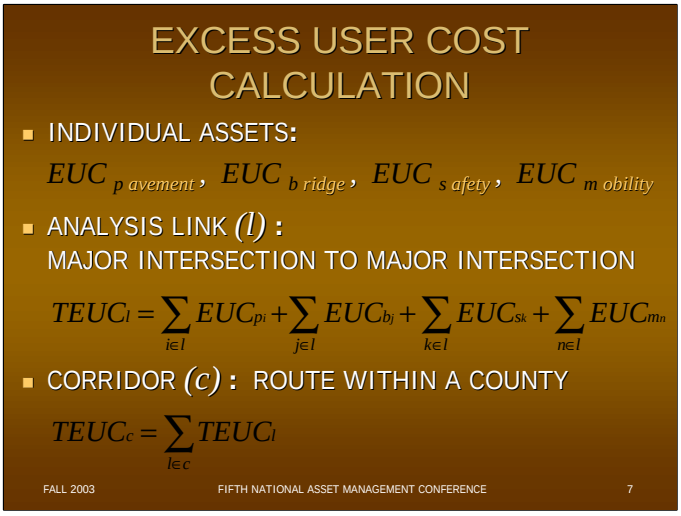
Let’s focus on how the numerator of the benefit cost ratio is calculated.

Benefits attributable to each candidate investment in the tradeoff model are the annual decrease in excess user costs resulting from the investment.

Excess user costs are defined as costs incurred by users that are attributable to less than ideal conditions. These costs are over and above normal vehicle operating costs.

Examples include: a pot-hole which ruins a tire, or a truck which must detour due to a weight posted bridge, or an accident which may have been prevented with a highway improvement.

Excess user costs occur when an agency has a backlog of unfunded candidate projects. They are similar to a hidden tax that reduces the state's economic productivity and hinders economic redevelopment and growth initiatives.



The tradeoff model calculates excess user costs for each: asset, analysis link, and analysis corridor.

Individual assets are: each pavement management section, each bridge, each highway safety high accident location, and each traffic congestion bottleneck.

Analysis links are defined as major intersection to major intersection. The State Highway System has approximately 7,000 analysis links. The excess user cost for each link is the summation of the costs for the individual assets associated with the link.

Corridors are defined as a touring route within a county. The State Highway System has approximately 1,300 corridors. The excess user cost for each corridor is the sum of costs for the links that make up the corridor.

The power of the tradeoff model is the ability to combine individual asset benefits into logical groups -- such as links and corridors – using a common measure.

Let me show you an example.

TRADEOFF MODEL SAMPLE OUTPUT

CORRIDOR ANALYSIS – EXCESS USER COST

CORRIDOR: ROUTE ZZ REGION: YY COUNTY: XX
FROM: KATHLEEN STREET TO: ALE HOUSE ROAD MILEAGE: 24.2

ANALYSIS LINK	EUC PVT ($000)	EUC BRIDGE ($000)	EUC SAFETY ($000)	EUC MOBILITY ($000)	SECTION TOTALS ($000)
L1	50	-	100	-	150
L2	40	40	-	-	80
L3	-	30	-	20	50
L4	-	80	40	30	150
L5	120	100	50	100	370
L6	90	-	60	110	260
CORRIDOR TOTAL	300	250	250	260	1,060

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This table is an excess user cost output from the tradeoff model for a hypothetical corridor. Each row of data is for an analysis link within the corridor. In the second through fifth columns, excess user costs in thousands of dollars are calculated for each asset type; (pavements, bridges, safety, and mobility).

Totals are shown for each link and each asset type. For the entire corridor, excess user costs are more than one million dollars.

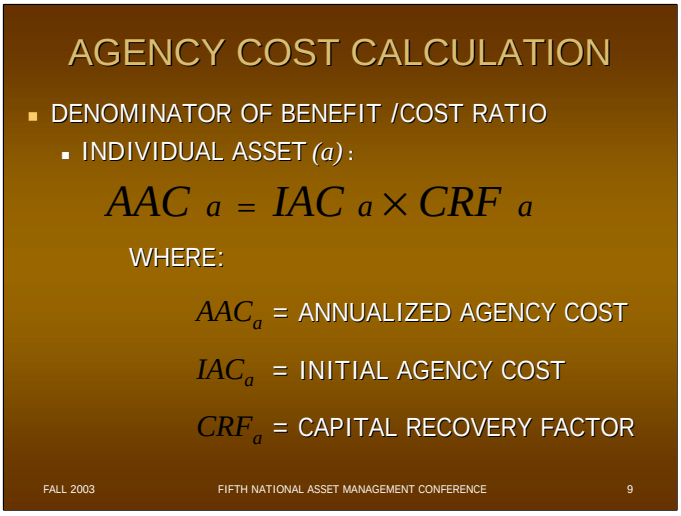
This table can be used to conduct tradeoff analysis of benefits vertically within the asset class or horizontally among the asset classes.

Notice that, from a user benefits point of view, link L5 is the best investment opportunity.

(The tradeoff model is capable of sorting the output rows using any data column in the table. Sorts in descending order show the locations with the greatest excess user costs.)

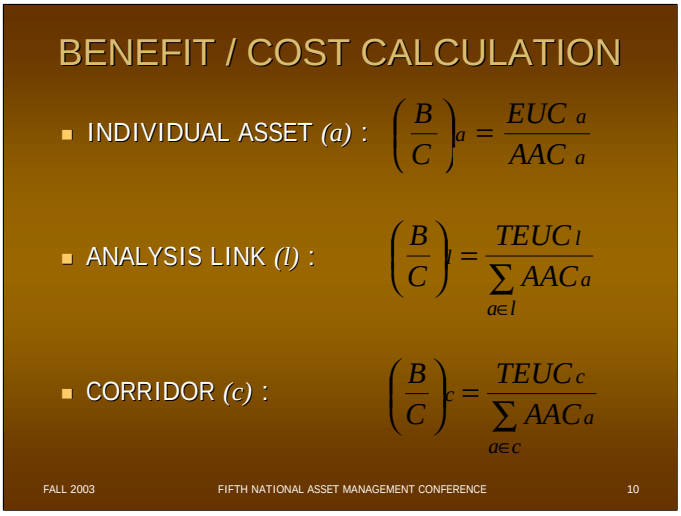
(The prototype statewide excess user cost report is 287 pages long, at the link level of detail.)

Let's focus on how the denominator of the benefit cost ratio is calculated.



The initial agency cost for each investment is used in the denominator of the benefit-cost ratio. Because the user benefits calculation used as the numerator of the benefit cost ratio is an annual estimate, the initial agency cost must also be annualized. To annualize agency costs, a capital recovery factor is used, which is based on the service life of the investment and a discount rate.

The cost, scope, and schedule of each investment candidate is established by one of the stovepipe management systems or an initial project proposal.



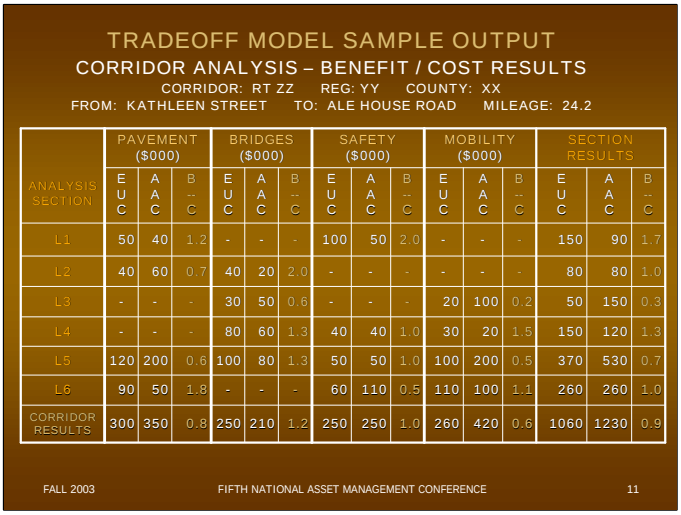
The benefit and cost calculations attributable to each investment are summed, on demand, to form overall B/C ratios.

For each analysis link “l”: the benefit-cost ratio is the total excess user costs associated with link “l” divided by the sum of the annualized agency costs associated with the link.

For each corridor “c”: the benefit-cost ratio is the total excess user costs in the corridor divided by the sum of the annualized agency cost for all repairs within the corridor.

A minimum B/C ratio criteria can be applied when the summation is requested.

A listing of investment candidates with high benefit / cost ratios is the usual tradeoff model output that is used to create a table similar to the following example.



TRADEOFF MODEL SAMPLE OUTPUT

CORRIDOR ANALYSIS – BENEFIT / COST RESULTS

CORRIDOR: RT ZZ REG: YY COUNTY: XX

FROM: KATHLEEN STREET TO: ALE HOUSE ROAD MILEAGE: 24.2

ANALYSIS SECTION	PAVEMENT ($000)			BRIDGES ($000)			SAFETY ($000)			MOBILITY ($000)			SECTION RESULTS		
	EUC	AAC	B--C	EUC	AAC	B--C	EUC	AAC	B--C	EUC	AAC	B--C	EUC	AAC	B--C
L1	50	40	1.2	-	-	-	100	50	2.0	-	-	-	150	90	1.7
L2	40	60	0.7	40	20	2.0	-	-	-	-	-	-	80	80	1.0
L3	-	-	-	30	50	0.6	-	-	-	20	100	0.2	50	150	0.3
L4	-	-	-	80	60	1.3	40	40	1.0	30	20	1.5	150	120	1.3
L5	120	200	0.6	100	80	1.3	50	50	1.0	100	200	0.5	370	530	0.7
L6	90	50	1.8	-	-	-	60	110	0.5	110	100	1.1	260	260	1.0
CORRIDOR RESULTS	300	350	0.8	250	210	1.2	250	250	1.0	260	420	0.6	1060	1230	0.9

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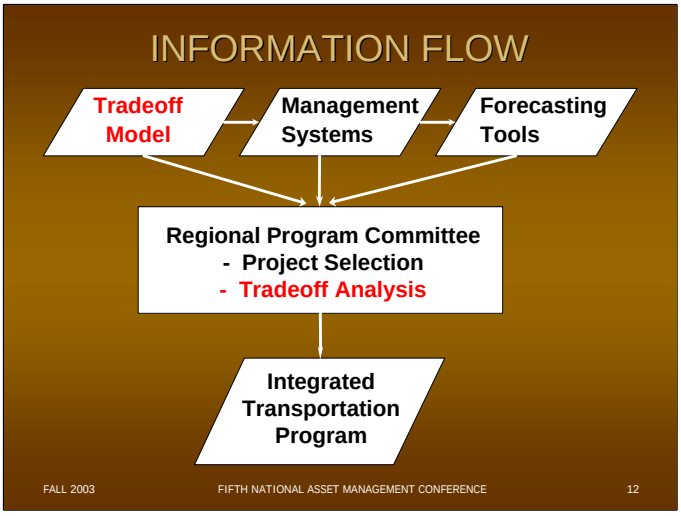
This table is a benefit - cost output from the tradeoff model. It extends the previous table on excess user costs by adding the annualized agency costs (AAC) and the benefit cost ratios for each goal area.

This summary will assist in making tradeoffs vertically or horizontally.

Notice that when agency costs are introduced to the equation, link L5 no longer has the highest potential for treatment due to the high annualized agency cost associated with the repair strategy. Link L1 appears to be the best investment.

For the corridor, the B/C ratio is 0.9.

The tradeoff model is capable of sorting individual assets, analysis links or corridors by B/C ratio.



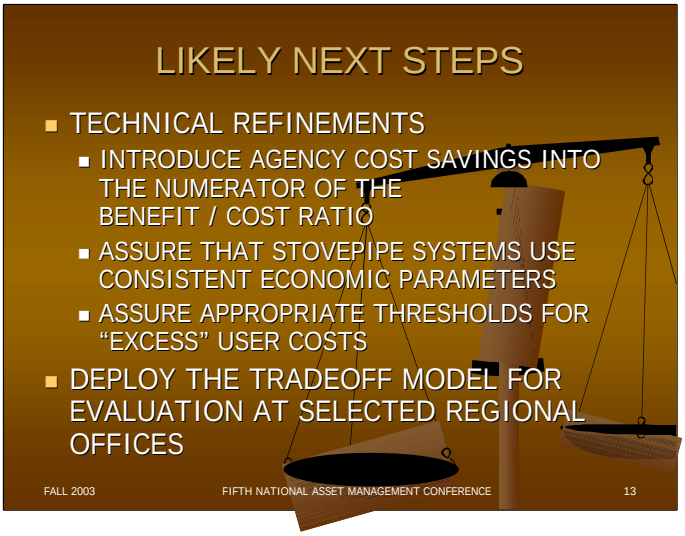
This slide shows information flows from the tradeoff model -- shown in red --, and its relationships to the pre-existing project selection process – shown in black. Program Committees in each of our 11 Regional Offices are the Department's project selection decision makers.

The tradeoff model does not replace performance measures from the stovepipe management systems and network-level condition forecasting tools.

Benefit / Cost ratios feed the asset-specific management systems, and add an economic evaluation performance measure to the condition-based outputs of these systems.

Excess user cost results are a common customer-focused performance measure. They assist the Regional Program Committees in making quantitative tradeoff decisions among diverse candidate project proposals.

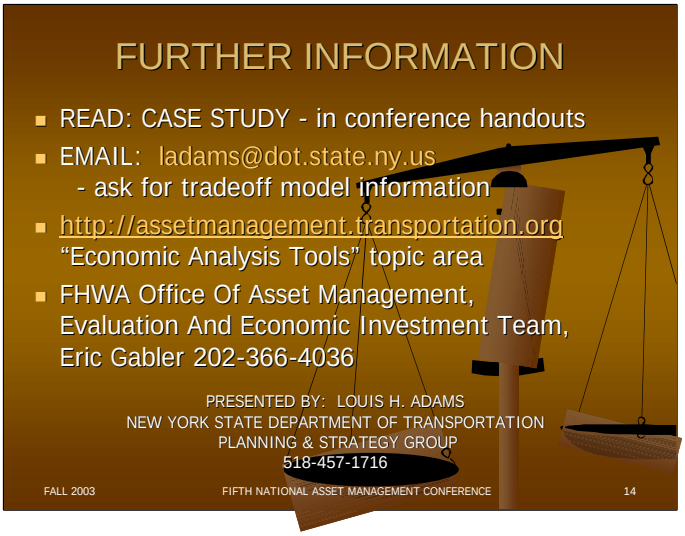
We expect the new information flows to result in a better integrated and more cost-effective transportation program.



Several technical refinements to the tradeoff model are likely prior to an evaluation phase. A team of mid-level managers will guide future technical work.

Currently, New York's Department of Transportation is undergoing a major transformation in how it measures and accounts for its performance. This transformation responds to three primary factors shaping the Department's future: trade; technology; and traffic.

In May 2003, the Department announced that it would deploy transportation asset management system to serve as the framework for managing all infrastructure investments. Before implementing asset management practices statewide, selected Regional Offices will evaluate technical tools, including the tradeoff model.



The first place to look for more information is a printed case study in the handout package for this conference.

Please send me an email if you want me to send you a manuscript for a forthcoming TRB Transportation Research Record and my speaker's notes from the last two TRB annual meetings.

AASHTO's Transportation Asset Management Today web site is an online virtual community of discussion and references with up-to-the-minute news and views contributed by subject matter experts and the public.

FHWA's Office of Asset Management staff have their fingers on the pulse of the latest developments and are available to confer with you.

Thank you for your participation in this workshop.